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WASHINGTON 25, D. C.

R
SUPERVISION
General

July 7, 1952

Regional Foresters
and Directors

Dear Sir:

In conjunction with their attendance at the World Forestry Congress held in Helsinki, Finland in 1949, Messrs. L. I. Barrett, E. C. Crafts, T. Haig, and I. J. Mason visited the forests of Sweden, Germany, France and Denmark. The purpose of the European field trips was to obtain first-hand knowledge of forest practices, policies, procedures and special techniques in countries where forestry has long been practiced intensively, and to appraise what they saw in terms of possible use in this country. *g. H. Stone,*

Sometime after their return to the States each man prepared a memorandum on his trip which was made available to the Washington Office. Since these memoranda include information of general interest and present a professional view of forestry in Europe, we are making a combined edition of these memoranda available to the field. Enough copies are being sent to you to reach the Supervisor and Research Center level. If further distribution is desired, routing will be necessary to Rangers and Project Leaders.

Very truly yours,

V. L. Harper
V. L. HARPER
Assistant Chief

Attachment



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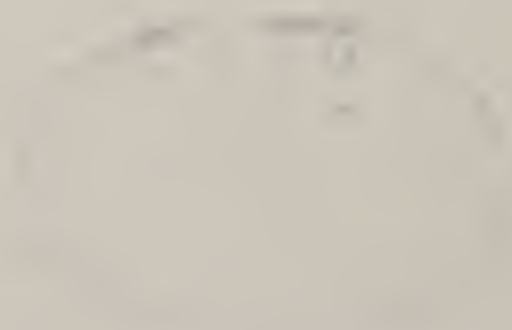
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UNITED STATES DEPARTMENT OF AGRICULTURE

✓ U.S. FOREST SERVICE,
WASHINGTON

June 23, 1952

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X Impressions of European Forestry //

By

L. I. Barrett
March 17, 1950Introduction

Before describing major impressions of European forestry that might be of value to us in this country, I wish to express appreciation for the opportunity of making this trip. It is difficult to anticipate just how these impressions may have tangible benefits in our own jobs, but I feel very strongly that the European trip served not only as a great personal stimulus, but also to clarify a number of my own professional views on conservation issues, both technical and general. In addition to these professional aspects the opportunity to meet with and observe the people, the customs, and the ways of life in five European countries has been a very broadening influence and has developed a better understanding of international issues and the part that the United States is playing and must play in world affairs.

On the professional side there is not a great deal in technical European forestry that can be picked up intact and applied to our own forest problems. There are a few gadgets that merit trial on an experimental basis in this country. These I will discuss in a separate section of this report. However, I do believe we could benefit a great deal by some of the principles, attitudes, and philosophies used by European foresters in approaching their jobs. It is upon these that I wish to concentrate first and I have attempted to organize them under subheadings familiar in our own terminology.

Cutting Practices

The pre-eminence of even-aged methods of silviculture is an outstanding impression which somewhat reversed my previous concepts. Even with the tolerant species such as Norway spruce, European foresters in the countries we visited almost invariably practiced some form of even-aged rather than all-aged silviculture. Major exceptions to this were on the best sites. They seem to follow the general principle that forest income is at its greatest under some variant of even-aged silviculture, except in the most productive environments.

I gained the very distinct impression that this was due primarily to a sound fundamental knowledge of the basic silvics of each species. The

(Over)

officer in charge of a forest would nearly always preface his remarks with a brief explanation of the requirements of the species for germination, early survival and later development, which indicated to me that his overall silvicultural philosophy was guided primarily by a sound grounding in the nature of the species he was dealing with. To me this was in sharp contrast with the way in which the average American forester approaches the choice of a basic silvicultural system. It implies further that our own research programs in this country fall short in that for a number of years we have been making very little effort to get precise information on the basic requirements of our many species and how these requirements might be modified by factors of site. Along with this basic knowledge of silvics, the European forester has a much better grasp of the meaning of soils and climate as they modify the basic silvicultural method than do our own foresters. Local conditions of soil, wind, frost, and other factors of climate are major influences in shaping and modifying the techniques used in applying the general silvicultural philosophy. These factors of environment are primarily responsible for the way in which strip-cutting is done and the direction in which it proceeds, such as we saw in Hartz Mountain spruce forests and the wedge method in spruce and fir. These two methods are basically the same, but take different mechanical form to meet local variations in climate and topography.

Biotic factors also have an influence in the silvicultural method. For example, on one of the State forests in Denmark, the width of strips was controlled by the amount of area that would receive continual shade from the adjacent body of uncut timber. The forester reported that the insect Hilobius abites could be kept under control by shading cut-over areas. This insect is a distant relative of our New England pales weevil and attacks planted and natural reproduction of spruce in the same way that our native insect attacks the regeneration of white pine. In this case the basic system of even-aged silviculture was modified to control an insect, and the width of strip to be regenerated was dictated not by the effective seeding radius of the adjoining green timber, but by width of strip that could be shaded for insect control. Alternating crops of spruce and beech have been found effective in minimizing the damage due to Fomes annosus on some sites, mainly old fields. Care is given in the Scotch pine forests of Sweden and Finland to maintaining a small proportion of birch as a soil conditioner, even though when grown in this way the birch does not command a very ready sale.

All of this adds up to the fact that the European forester couples a sound grasp of basic silvics with an unusual knowledge of local environment to arrive at a silvicultural practice adapted to a particular set of conditions on the ground.

The extent to which European foresters recognize superior individual trees and stands in their practice was another outstanding impression. Along toward the end of our trip in Sweden I was somewhat amused at the remark of one Swedish forest inspector that practices in genetics were lagging woefully behind knowledge of the subject. We had already seen one small forest nursery where the supervisor reported that he culled as much as

70 percent of the stock before planting and had heard so many explanations of the importance of choosing superior local seed sources in collecting seed for reforestation purposes, that it seemed to me the Swedes were two or three generations ahead of our own performance in this respect.

Illustrative of the high value placed on superior seed sources is the experience of Professor Gron of the Danish Forest School. Some years ago he purchased a 500-acre Douglas-fir forest which was recognized as a strain unusually well adapted to certain areas and sites in Denmark. A large part of his forest income is derived from sales of seed collected on this forest. In the year 1948 he told us that \$10,000 worth of seed was sold from his area. This idea of selection is constantly practiced not only in seed collection and nursery practices, but appears to be a part of the working knowledge of the forester engaged in thinning and harvest cutting. During these operations he was guided not only according to silvicultural rules as to density and crown class, but also as to retention of superior trees for future crops and as seed trees for natural regeneration.

Some of the countries have progressed rather far in other phases of genetics such as the production of hybrids and strains having figured wood. In fact, I gathered that a good deal of research in Denmark and the Scandinavian countries was directed to this end. If practice is lagging behind research it is probably in this particular field, because we saw or heard about very few, if any, plantings of these special strains or hybrids on anything but an experimental basis.

Planting and Seeding

At first glance the European forester seems to know no economic caution when it comes to the artificial establishment of a new crop. Reforestation commonly costs \$80 to \$100 and in Denmark we were shown areas where the cost was \$200 per acre or more. Under the economic section, I will discuss this a little further, but there appear to be two reasons for incurring these high costs. First, the European forester is absolutely intolerant of poor stocking. Consequently, in planting or seeding projects he expects an initial establishment of eight to ten times the number of trees per acre that we do. Second, due to his belief in the advantages of selection he wishes to have a very large selection of trees to choose from in picking final crop trees. I was particularly impressed with the advantages of this in a red oak (our native northern red oak) plantation in Denmark. Here initial establishment had been from 8,000 to 10,000 trees per acre and at 20 years range in size was up to 8 inches d.b.h., although the majority of trees were only 1 or 2 inches d.b.h. It was obvious that had an initial spacing of 6 feet or more been used, the relatively small number of individuals reaching 6 to 8 inches would have been so widely spaced that extreme branchiness and wolf tree tendencies would have been developed. However, with a very much closer spacing the small proportion of trees with very rapid growth rates were closely enough spaced to develop good form and one could already see that a sufficient number of these very fast growing trees were available for early thinning and final crop trees.

Direct seeding, particularly in Finland and Sweden, is a rather common forest practice. In areas where natural decay of duff is slow, fire has been used for many years as a site preparation measure. The Swedes told us that direct seeding had been a common method of reforestation with them for over 70 years in both spruce and Scotch pine forests. It seemed to me that one reason for this success was a relative lack of high natural bird and rodent populations in the forest since in most cases seeding is done without any prepoisoning or special attention to possible damages from these sources. We were also told that damages by mice could also often be controlled by disking prior to sowing since the mice hesitate to venture far away from cover.

Because of their long experience with direct seeding a great variety of seeding equipment has been developed. One outstanding device which seems to merit trial in this country will be described in a later section.

Stand Improvement

Stand improvement as we often think of it in this country is not a common cultural measure in European forests. By this I mean that thinnings, clearings, or improvement cuttings made for the primary purpose of enhancing the future value of the future forest stand but without immediate income from the operation itself is uncommon. The markets permit sale of such very small material that nearly all such cultural measures are conducted at an immediate profit.

An outstanding exception is the swamp drainage program of the Scandinavian countries. The science of draining swamps as a forest improvement measure has been highly developed in both Finland and Sweden, and is considered of sufficient importance to merit separate courses of instruction at the forest schools. I was quite interested in this field because the two attempts made in our own research program indicated that the beneficial effects of swamp drainage were limited to a distance of little more than half a chain on either side of the ditch. Finnish experts in this field reported that sphagnum swamps were hardly worthwhile draining since the ditches would have to be spaced about 60 feet apart in order to improve forest growth conditions throughout the swamp. This checked closely with our own experience and if my recollection is correct our swamp drainage projects at both the Northeastern and Lake States Stations were conducted in sphagnum bogs. The Finns have been able to classify swamps into five groups on the basis of the vegetation and from this classification can tell with some precision those swamps which it is economical to drain. Increased growth from drainage on the more responsive of these swamps is phenomenal. For example, they claim increases in growth of 15 times after drainage as compared to the growth on the natural undrained swamp. The large areas of swamp land in the Lake States and parts of the Carolinas where growth is slow might well benefit from the application of drainage following a vegetative classification similar to that worked out in the Scandinavian countries.

In view of the intense cultural practice on most European forests, I was quite surprised at how little pruning was done. Several forest supervisors characterized this operation as "a nice thing to do if you had some extra

money and a plentiful supply of labor." I was told that pruning was practiced as a regular improvement measure only in a few forests where a stable market for veneer and peeler logs existed. There are very good economic reasons in Europe why pruning is confined to such a limited practice. In the first place a good deal of timber is used in round form, and in the second, price differentials between high grades and low grades are so narrow that an investment in pruning is not justified for saw timber.

Grading and Measurement of Minor Products

Price differentials between different grades of pulpwood exist in the Scandinavian countries and this product is commonly marketed under a grading system. It occurred to me that enough is known in this country with respect to the yields of pulpwood per cord of sticks of different sizes and knot frequencies to provide a basis for grading our major pulpwood species. It would seem to me that products research would be worthwhile to ascertain the true relative values of different grades of pulpwood. In France we saw an extreme case where even fuel wood was graded.

Sales of small round material with diameters of $1\frac{1}{2}$ inches to 3 or 4 inches may be a long time in the future in the United States, but it is common practice in Europe and a number of very convenient standards for measuring this type of product have been developed which have no parallels in this country so far as I know, with the possible exception of weight such as is used in the tanbark and mine prop industries. However, intensive management is developing rapidly and it may not be too soon for Research, at least, to be thinking about suitable units of measure which would aid in handling thinnings of small material. For example, the Swedish "rise" consists of a pile of small poles crisscrossed on a stump and extending one meter high above the stump. Poles are crisscrossed in alternate fashion with poles extending outward from the stump in a "V." This is a standard measure assumed to contain a certain average cubic content. Likewise, the Danish "heap" is used to measure small poles from one to three inches in diameter and consists of a pile one meter wide and a half-meter high. The Danes figure the cubic content of a heap at .46 cubic meters. The small pole products of thinnings are bought and sold in these measures. Their advantage is that cost of scaling is very low compared with any similar measures in common use in this country.

Forest Operations

Three outstanding features of forest operations in Europe seem to me to deserve more thought and consideration in this country. These are the intensive road system, the universal practice of logging by management, and the housing of woods workers on or near the forest itself.

Logging by the management of a forest seems to be universally practiced and becomes an integral part of the silvicultural operation. On public forests allowance for logging costs are a regular part of what we would include in the P&M item. Products are usually sold at the roadside,

although I gathered that in some areas, such as in Sweden, drives on the rivers to deliver pulpwood and other products also were responsibilities of forest supervisors, where the agreed upon point of delivery was at the mill or a key concentration point.

I was greatly impressed with the excellent system of utilization roads which now exist. The European situation serves to emphasize the fact that we are going through a development period here which will some day reach an end and that the sooner we can complete our primary network of utilization roads, the sooner we will be able to enter into intensive management. According to the figures I was able to gather, road frequencies range from 5 miles to 9.4 miles per thousand acres of forest. This did not include temporary or unsurfaced haulways, sled roads, or other temporary skidding roads that might not be used for more than two or three successive operations in the same stand.

Housing the forest workers in the forest either in small communities of a dozen or more homes with a central heating system, in villages existing on the forest, or in single homes scattered through the woods seem to be a common feature. I gathered that in Sweden, at least, there had been a considerable amount of housing construction for woods labor in recent years. It was explained that this was made necessary by the competition offered by other industries and that greater benefits of this kind were the only way in which forest managers could keep a supply of labor available. Although fairly small, these houses were far from being shacks. In fact, some of them were actually as good as the more modest homes that forest officers occupy in this country. In one Swedish forest these homes rent for \$10 a month where the daily wage of a forest worker is \$4.

The number of woods workers maintained by the forest is, of course, very high by our standards. For example, one national forest of 90,000 acres in central Sweden used one woods laborer for each 225 acres of forest. The intensively managed Gesselfeld Forest of 5,700 acres in Denmark used one permanent woods worker for every 285 acres and during the logging season used 130 laborers in addition to the permanent workers.

Indicative of the present capital expenditures for laborer housing was the case of another forest in Sweden where the supervisor told us that although his regular income above normal costs amounted to 1,000,000 Swedish crowns, this would be reduced to 400,000 crowns in 1949 because of an expenditure of 600,000 crowns for laborer housing.

Organization and Inspection

One very interesting device used in checking up on the performance of responsible officers on public forests is the resource management plan and its frequent revisions. Reinventories of the forest, growth determinations, and allocations of cut are made every 5 to 10 years. Breakdowns by type and condition class are mapped more intensively than we are doing it even on most of our experimental forests. Such surveys are the responsibility of

the central forest office and provide a rather precise check on the actual condition of the resources and what the forest manager's program is doing to it. In many countries this process of rechecking on the resources is called "the taxation" and I gathered that a tremendous amount of reliance was placed on these reexaminations of the resources in judging the adequacy of the forest officer's performance.

One of the best clues to the intensity of practice in Europe is the number of supervisor and ranger-grade personnel per unit of area. The figures I gathered showed a high of 1,000 acres per ranger on the intensively managed Gesselfeld Forest in Denmark to 22,500 acres per ranger on a national forest in central Sweden. When supervisory personnel on the ground are added to the forest the extremes varied from 715 acres per man to 15,000.

I got the very distinct impression that there was a very considerable amount of flexibility exercised in using the skills of technical foresters. For example, one forest supervisor was not only responsible for the management of his forest, but in addition was in charge of the fire protection organization for two additional forests. Another who had special skill in managing log drives and unusual local knowledge of streams was the drive boss not only on his own forest but on all, or parts, of others. Not exactly similar, but still indicative of the use of special skills, was the practice in Germany of making professors at some of the forest schools supervisors of small public forests.

Genetics

In most of the countries I visited, genetics seemed to be the outstanding subject of current research. Efforts are being directed not only toward the development of hybrids for faster growth and better form and quality, but special strains are being developed for the production of figured wood. Strains having many other characteristics of advantage in forestry are also being developed through selection and breeding. Outstanding are current efforts to establish seed farms of these superior strains which will guarantee reliable sources of seed for planting.

Management

European experience provides material for a good deal of thought in the field of forest management. I had expected to find a more highly developed management philosophy than seems to exist. Perhaps I can illustrate this point better by reciting the experience of the Copenhagen City Forest in Denmark. This area of 3,000 acres has been operating under a management plan for 150 years. I asked to see the past records of annual cuts on this area, but unfortunately early records had been destroyed during the war. However, during the 10 years from 1935 to 1945 the annual cut had varied from 10,000 to 20,000 cubic meters. The responsible forest officer claimed this was not due to pressure of war needs nor a desire to cash in on high prices. Dates of the extreme variations in cutting lend support to his contention. In other words, under the most intensive type of

silviculture there was still a variation of 100 percent in the volume of annual cut. On another Danish forest, which had also operated under similar management plans for 150 years, there was still a very large unbalance of age classes and again a wide variation in annual cut. I have always conceived the major function of management to be the planning of forest operations so that after a period of adjustment annual income would be relatively stable at the highest level of production which the sites on the forest permitted. European experience would indicate this objective was pretty academic, never to be attained in practice except within extremely wide limits.

However, in spite of this I gathered as a result of discussions with European foresters that interest in regulation of the cut had been greatly submerged by the extreme emphasis placed on silvicultural practices. A few Swedish foresters understood this problem very clearly but the language barrier was too great to permit discussion on any concrete technical level. We were informed, however, that the Forest Research Institute of Sweden had a project on this subject and that one of the most capable men there, Dr. Petrini, was working on the problem.

The compartment concept as practiced in Europe seems to be a major reliance of management. I gathered that compartments were not so much topographical logging units as they were age-class or condition-class units. Most of them are very small by our standards and vary from 10 to 50 acres in size. Each constitutes an individual treatment unit to be reproduced, tended, and finally harvested at maturity. The present compartment pattern probably stemmed from the initial condition of the forest when management was undertaken and naturally resulted in area regulation of the cut. With the greatest emphasis being placed on improvement of the silvicultural condition of each age and condition class unit as it existed at the time management commenced, it is apparent that wide variations in annual cut would eventually develop where a poor balance of age classes existed initially. After silviculture has rehabilitated each compartment, considerable difficulty is experienced in adjusting the age-class distribution since this often would require sacrifice of rapidly growing stands to effect a more balanced representation of age classes. Perhaps more thought should be given to such problems at the initiation of management and steps be taken early to eventually arrive at a reasonably good balance of age classes.

The above discussion has been tied to a management situation which obtains where even-aged silviculture appears to be a sound biological basis. Management problems are comparatively easy to grasp under this type of silvicultural philosophy. However, the same problems exist where all-aged silviculture is the alternative.

Very probably the management objective of stable annual production can never be fully achieved. Windstorms, fires and insects and diseases will make this impossible. The periodic occurrence of emergencies, such as war or of unusual economic opportunities, are other reasons for variations in annual production. It seems to me that these are expected variations to be dealt

with as they occur. They are in an entirely different category than the wide variations in annual cut resulting from failure of professional foresters to give proper attention to management techniques. I am not arguing for less application of silviculture in putting forest lands under management. However, the European experience I encountered leads me to believe that a better balance of attention to both silvicultural and management techniques is important to our management planning. There is a serious question in my own mind as to whether adequate techniques exist for the effective attainment of the management goal of relatively stable annual cuts. Surely we should be able to better the 100 percent variation in the example cited at the beginning of this discussion.

A final factor worthy of mention is the extent to which the products of thinnings and improvement cuttings formed a part of annual budgeted cuts. We were told so often that the annual cut consists of 50 percent mature timber and 50 percent thinnings that this would seem to constitute almost a universal objective for intensive practice.

Economics

The economic climate in which European foresters work is so different from our own that some discussion of it is necessary to explain how a European forester can do things almost incomprehensible to us.

Outstanding among many impressions of this is that the forest manager in Europe is not in competition with industries engaged in liquidation of forest resources. Forest products are universally the result of timber growing and since the economy of these countries requires forest products, the timber grower is in a position to charge the cost of growing a crop, in addition to the current operating cost and allowance for profit. Traditional uses of small round material for fencing, scaffolding, and even some construction, are so firmly established that in most places ready markets exist for the products of thinnings beginning at 15 to 20 years of age in most coniferous stands. This is reflected in the relatively high proportion of the total cost of a product that is returnable to stumpage. In general, I would say that stumpage represented from 60 percent to 80 percent of the total cost of a product as compared to 10 percent to 30 percent under our conditions. Undoubtedly, the trend in this country will be toward this European ratio as we become more and more dependent on growing timber rather than liquidating the natural growth. I am afraid that there is a general feeling in our group that European foresters were not economic conscious and were overwhelmingly interested in silvicultural processes. I would analyze this situation in a little different way. I found very few forest supervisors, for example, who did not have at the tip of their tongues a statement of the annual net earnings from the forest. These varied between about \$5.50 to \$20 per acre annually. It seemed to me that perhaps the European forester had quite clearly in mind what the income should be from his particular forest on the basis of long-time experience and that he recognized the fact that continuance of this income depended upon maintaining the high densities and growth rates that had produced such

income in the past. Hence, if one step in maintaining this income required artificial regeneration at \$200 an acre, he did not hesitate to make that expenditure. It is true that the European forester could not tell us how the cost of a single operation or silvicultural process affected the eventual net income. Apparently our tendency to think of the costs and returns phase of individual forest improvement measures is not a common concept in Europe. This does not mean that we should do likewise, and particularly is this true during our current era of competition between the grower and the liquidator of forest stands.

Research

The foregoing comments have been mainly rather complimentary to the technical attainments of European foresters. Perhaps this is because of an emphasis to find in their experience something of use to us. However, this does not mean that no improvements could be made in European practices. If I were to make an overall criticism it would be that complacency and satisfaction with attainment of workable techniques are blinding many European foresters to the possibilities of improving their methods. This was perhaps most pronounced in Germany and least so in Sweden and Finland.

Our experience in the Spessart Forest of Germany is perhaps the outstanding case illustrating the above point. From what we were told there is apparently no question that here oak (Quercus sessiliflora) is grown successfully on long rotations (350 years) for high-quality veneer. The culture is very intense with thinnings every 5 years beginning at age 20. Regeneration is by both natural and artificial means with the main reliance on seeding. A major obstacle--eating of acorns by wild boars--has been overcome through a method of seeding that takes advantage of a characteristic of the wild boar and allows a satisfactory percentage of the acorns to escape detection by them. Thinnings are very light and stands kept at a high density to avoid development of epicormic sprouts. We were told that the silvicultural objective was to grow trees with an average annual ring width of 0.973 mm.

Our questions brought out the fact that past products research showed that equally satisfactory veneer could be made from logs having three times this ring width. In other words, the rotation could be cut from 350 years to 115 years in so far as ring-width effects on veneer quality are concerned. There then remained the question of whether opening stands sufficiently to attain this increased growth would produce enough epicormic sprouting to degrade log quality significantly. It is well known that epicormic branches produce knots as do other branches. We then inquired as to available information on the effect of different intensities of thinning on development of epicormic branches. We were told that a few small plots had been established elsewhere to test this but that the experiment had been only 30 years old at the time records were destroyed and stands damaged during the war, and that no worth-while results could be obtained in only 30 years. We were inclined to challenge this since epicormic sprouts appear quickly and useful information on stand density after thinning as it affects development of these sprouts can be obtained in five and certainly in 10 years.

In the meantime, management of the Spessart oak continues in the same way that it always has since development of a successful method.

We encountered a number of other cases where the same disinclination to question present techniques or seek improvement in them were only too apparent. My own feeling was that much of this was due to the lack of a really aggressive research program, except in genetics. Too often research seems to be parcelled out to professors and a few forest officers with a specific interest. A good deal of research, therefore, is on a part-time basis and the number of full-time research men seems very small. My own impression was that research was far from a potent influence in European forestry (with a few exceptions already noted) and that if a strong research program does nothing more than reduce complacency and develop a more questioning attitude on the part of a profession, it is well worth while.

Equipment, Materials, and Publications Meriting Special Attention in this Country

1. Repellents. The Germans described to us what sounded like a very effective deer repellent. From their description I judged it was an odor rather than a taste repellent, Forestasan, and, if so, it differs from anything thus far available in this country. An order has been placed for some of this repellent and a shipment is now enroute to this country. Exploratory trials of the repellent will be made by four regional stations during the coming year.

2. Scalping Machine. This was a very clever horse-drawn device which is used for removing the humus in small spots at regular intervals to prepare the land for planting or seeding. It appears to be suitable for scalping in tough sod also. Spacing of spots is adjustable and the Finns credited this machine with reducing the cost of spot seeding operations to 1/3 of old methods. They claimed an average production of $6\frac{1}{2}$ acres per man-day with the spots spaced about 4x4 feet, I judge. This scalper is manufactured by the TEIJON TENTAAT O.Y. - TTKO BRUKS A.B. Finland, and sells for about \$175 in Finland. I have a photograph of this machine and the Washington Office will be glad to help arrange purchase of one or more of them if any station is interested in it.

3. Log Loader. This is a hand-operated winch mounted on a log trailer that we saw in operation on one of the oak forests in France--the Troncais National Forest, I believe. This is capable of handling large heavy sticks and with some modification might have possibilities in this country. Mr. Mason was particularly interested in this device and probably has more detailed information on it.

4. Hand Tools. The Europeans have developed a tremendous number of hand tools for special services, most of which have no particular application here. The Scandinavians, however, are currently engaged in a good deal of research on production costs in the woods and it was my understanding that they are finding very considerable advantages to lighter weight hand tools, particularly axes. I am not aware of any such trends in this country and perhaps the comparative efficiency of different weights and patterns of axes

merits some attention here. I also saw in Finland a light weight portable tree jack used in cutting cord wood. After the tree was felled this jack was placed under the tree several bolt lengths back of the butt and the whole tree raised above the ground level to a convenient cutting height. After the bolts had been cut off back to the jack, it was moved further up the tree and the process repeated. The whole maneuver was done very quickly and seemed to me had possibilities for lowering costs of pulpwood production.

5. Swamp Drainage Techniques. This has already been discussed in the section on stand improvement. In view of the present pulpwood situation in the Lake States in the tremendous areas of swamps in that area there will undoubtedly be some interest in this matter eventually developing in that region. I have a number of references to Finnish texts dealing with swamp drainage and would be glad to obtain copies for anyone interested.

6. The publication "Forestry in Denmark," by Axel S. Sabrol, was published by the Danish Forest Society, Copenhagen, in 1947. English editions are available. This contains some very fine information on all phases of forestry. However, an outstanding feature is the presentation of thinning procedures and guides which the Danes have developed possibly further than most other countries. Part of this presentation is a series of graphs showing by site index and age the volume, basal area, number of stems per acre and average diameter of the ideal growing stock at the mid-period between thinnings. Also shown are average annual growth rates and the volume of materials removable as thinnings. These graphs constitute the most complete guide to a thinning schedule and the ideal growing stock that I have seen. The approach used is applicable where either plantation culture or even-aged methods are the basic silvicultural systems. It seems to me that study of these might be of considerable help in clarifying objectives and thinking out the techniques of attaining them to those of our research group engaged in thinning studies of even-aged stands.

I am unable to quote a price for this booklet, but am sure that copies could be obtained through the Danish Forest Society, Copenhagen, Denmark.

Impressions of European Forestry

By *Edw. C. Crafts*
Edward C. Crafts 1910-
October 5, 1949

First, I wish to express my personal indebtedness to the Forest Service for including me in the party. It was an unparalleled opportunity to see not only European forestry but also the rural way-of-life in several European nations.

Heretofore, my common reaction to reports brought by returning travelers was that they often saw little, probably missed much, retained isolated details, and were impressed mainly by the usual tourist attractions. I can now appreciate some of their difficulties in sifting the wheat from the chaff. Never having been abroad before, I started out with a determination to see all, absorb all, and retain all. However, the problem soon became one of over-saturation. As many details faded out, there remained the job of coalescing impressions and scattered bits of information into a few major and tangible points of view having relevance to my own work and that of the Forest Service in general.

Some of the greatest, though intangible, values were the discussions held, and acquaintances gained, with professional colleagues in other nations, as well as the somewhat cursory knowledge obtained of forest conditions in a number of countries. Although it is difficult to assess the worth of such intangibles, any broadening experience such as the Forestry Congress and the trips through various nations tends to temper, mature, develop tolerance, deepen understanding, and break down provincialism.

Supplementing the above preamble, my major impressions are listed below. They may differ in some respect from those gained by other members of the party, but it would be odd if all observers gained exactly the same impressions.

1. The economic and social conditions of Europe and the physical character of European forests are so different from those in the United States that European forestry is not directly applicable to the United States. The reliance of early U. S. foresters on European methods is understandable; but American forestry has matured sufficiently and now has behind it such a wealth of experience that further extensive dependency on European forestry is inadvisable. Examples of some of the major differences, which are reflected in the intensity and types of forestry practices feasible in Europe and in the United States, include:
 - a. Forest resources are more essential to the national economy of European nations than in the U. S.; and their essentiality is generally recognized by the people. In Scandinavia forests are the principal natural resource, and forest products constitute the

key export by which these countries obtain purchasing power for vital imports. On the other hand, the western European nations are timber deficit countries. Forestry is a means whereby these deficits may be lessened, thus reducing the necessity of expending foreign exchange on timber imports. In none of these nations is foreign trade in forest products so relatively unimportant as in the U. S. The people recognize the importance of forests, because of either the valuable surpluses or the definite shortages of forest products.

- b. The recognized importance of forests by the people, and the relatively greater degree of State (national) control over economic activities in Europe has resulted in forest policies and programs that are further advanced than in this country. Major questions in this country--such as relative degree of State vs. Federal activities, and the private right to do public damage vs. the private responsibility to protect the public interests guaranteed by State controls--are questions which have largely been resolved in Europe and mainly in the direction to which our forest program is pointed. In some respects present conditions in Europe may give an insight into future conditions in the U. S., especially with reference to public recognition of the essentiality of forests and public action to maintain forest productivity.
- c. The physical character of European forests is less complex than in the U. S. For example, in all of the Scandinavian countries only two species--Norway spruce and Scotch pine--are of outstanding commercial importance. Contrast this to the large number of commercial species in the U. S. Because of this simplicity European foresters can concentrate on intensive management of a few types and species, whereas we are confronted with the necessity of developing more empirical management practices for many species and types.
- d. The scarcity of land in Europe argues for continuous productivity. Land scarcity explains in part the emphasis on planting in lieu of natural regeneration. The idle years that frequently occur when there is dependence upon natural regeneration cannot be tolerated.

2. Forest regulatory laws afforded three significant deductions:

- a. Stability of tenure is the key to responsible forest ownership. A number of laws recognize this principle.
- b. Under intensive forestry, standardized rules of forest practice are unworkable. Dependency upon local boards and local foresters to determine "reasonable productivity" and "satisfactory conditions" is widespread. In this connection, I think the Forest Service has been correct in declining to enunciate specific forest practice rules for various types and conditions that might be applied under the various regulatory proposals.

- c. Small private forests are excluded from regulatory laws in some countries. Although the condition of small farm forests is poorer in Europe than other sizes and kinds of ownerships, as is true in the U. S., the practical difficulty of administering regulation is recognized by France which excludes from its regulatory laws private forests under 10 hectares.

In Sweden there is no free purchase or sale of forest land. As a consequence land remains in the same family or company for generations. Under certain special conditions permission can be obtained to buy or sell, but if an estate is purchased timber cannot be cut for sale from it for 5 years. The owner is responsible for obtaining reproduction after cutting, and if natural regeneration fails he must plant the land. Trees can be cut only when financially mature.

In Finland, the law requires only that an owner maintain his land in productive condition. Otherwise, he may do as he pleases. A private association acting as an agent for the Government offers free consulting work to private owners and prepares management plans. The owner signs a contract to follow these plans, but there is no penalty for violation. A proposed law would assess all private owners on the basis of acreage to finance intensified consulting work. The proponents of the law feel that owners would be more apt to take advantage of the proffered services if payment is required regardless of use.

In India, the law requires that private owners adhere to good forest practices. If this is not done the State takes over management of the property, returning any profits that may accrue to the owners. If the management results in a financial loss the State stands this loss rather than the owner, but can deduct such loss out of any future profits.

The French law, in addition to excluding areas under 10 hectares, prohibits permanent clearing of land on which forests now occur and requires owners to obtain a permit before cutting can proceed. This permit commits the owner to obtaining regeneration after cutting, but does not regulate the volume which can be cut. Such a proposal was recently voted down by the legislature.

3. Economics is a relatively minor consideration in the development of European forest policy. By this I mean business economics or the financial aspects of management, and particularly is this true on public forests. (Denmark may be an exception, but I did not visit this country as did some other members of the party.) Other members of the party may have gained a quite different impression, as there was much talk of costs of planting, stumpage rates, market values, etc. My feeling was that the discussions we had were necessarily so superficial that it was almost impossible to tell whether the forests discussed were actually yielding a profit under critical economic analysis. For example, interest rates and taxes were often disregarded. Also, I felt that regardless of cost accounting, the forests would probably be handled just as they are for reasons of broad national interest such as security, the desire to obtain dollar exchange, or to further the goal to putting idle land to work.

Economics is a factor, but apart from the economics of international trade, it does not greatly control nor even influence policy. High stumpage values, of course, aid and abet extensive planting and close utilization. But amount of expenditures for flood control on the St. Julian watershed in the French Alps are not determined by dollar economics. The key there appeared to be maintenance of vital rail and highway arteries to facilitate troop movements on the Italian border. The poplar plantations at Aix les Bain don't pay their way in dollars; the governing philosophy is that land reclaimed for France is the same as new land gained by conquest.

4. Silviculture at its best is an art as well as a science. This is especially noteworthy in Germany where, despite the German tendency to "follow the leader," there was a surprising amount of discretion by the local forester as to methods of cutting, thinning, stand improvement, etc. How the local forester senses the degree and kind of thinning necessary to expose undesirable species to frost killing and the use of noncrop trees for natural pruning purposes in the Spessart oak region are examples of silvicultural art which defy expression in written forest practice rules. General forest practice rules are largely avoided in Europe because, despite relative homogeneity of type, local condition of soil, exposure, past treatment, and similar factors are so varied that, at the level of intensity applied, general forest rules would hinder rather than help.
5. More attention is paid to forest soils in Europe. In examining the condition of a forest and considering desirable forest practices, the European forester always starts with the soil. The desirability for more attention to forest soils is one of the lessons that I drew from this trip. Also forest types are described by herbaceous vegetation rather than by the tree cover. The reason for this is that herbaceous vegetation is more sensitive to environmental differences than are trees, and thus is a better indicator of small site variations.
6. American foresters appear more inquisitive, less provincial, rely less on precedent, and are not bound by tradition. American foresters should respect European forestry and foresters, but we need not feel inferior nor apologize for the level of the profession in this country which has developed under greatly differing conditions. I received the general impression that America had advanced further in the techniques of forest surveys, engineering, forest protection, genetics, and photogrammetry, but that Europeans were definitely superior as silviculturists. The notable lack of research in some regions reflects the European tendency to be guided by custom, habit and tradition.
7. There is more subprofessional forestry education in Europe than in the U. S. The ranger school or its equivalent is quite common, but forestry training at the university level is fairly limited. For example, forestry is given at one university in Sweden, one in Finland,

one in France, and four in Germany. On the other hand, in Sweden 5 ranger schools and one junior college offer forestry training, as well as a school offering instruction in charcoal burning. In Finland, there are 6 forestry foreman schools. Many foresters in the State forest services receive only the subprofessional training.

The top positions of responsibility are reserved for a relative small elite group of men who have come from the forestry schools of university caliber. Contrary to the trend in this country of requiring rangers and other technicians to be university foresters, Europe has stayed with the earlier theory of subprofessional training. One of the results is that the university forester enjoys a distinction which does not apply to foresters in this country. On the other hand, many men of intrinsic ability are probably held back from jobs of real responsibility due to lack of university training.

8. The manufacture of block board in this country might offer an opportunity for more efficient utilization and reduction of waste. Possibly, this should be explored by the Products people. Block board is manufactured from spruce and pine edgings that are cut into small strips an inch wide, $3/4$ to 1 inch thick, and a few inches to several feet in length. These strips are then glued together and when faced with veneer form the core for building boards $3/4$ to 1 inch thick, and of almost any length and breadth. Block board is used extensively in lieu of 5-ply or thicker plywood.

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Impressions of European Forestry

By 

J. Herbert Stone

October 29, 1949

1. One of the very impressive points apparent on our European trip was the great importance of the forest resource to the economy and, consequently, to the freedom of Finland. The generally well-stocked forests of the country have provided the raw materials for Finnish industry and for export in rough and processed forms. These exports have enabled the Finnish people to build up foreign exchange and obtain the necessary steel and other materials which were needed to meet reparation payments to Russia. I was greatly surprised to hear from them that they expected to have payments completed by the end of next year. The importance of timber to Finland is recognized by the people as evidenced by the interest of the press, governmental agencies, and other leaders in Helsinki in the Forestry Congress. I have not been able to find in Time Magazine or any other publication in this country any reference whatsoever to the Forestry Congress in Finland. There may have been some press items somewhere, but certainly they didn't make much of an impression on the American press. I have felt that there is a lesson in this condition in Finland which should be related to our own forest conditions and have undertaken to emphasize this point in talks which I have made and will continue to make. In other words, I am trying to make use of this particular point in our I&E work.

2. Another point which was evident throughout all the European countries was the emphasis placed on silviculture and good forest management. Perhaps you recall that in Sweden we were told that the Forest Supervisor had what appeared to be a blank check for expenditures in the field of silviculture, but expenditures for improvements were strictly budgeted. We have a long way to go to build up our public understanding of the importance of silviculture but I believe it is something to which, particularly here in the South, we want to give renewed emphasis. Our silvicultural problems are quite different, of course, and one of the most important here in the South at the present time is the need for timber stand improvement program. We are doing as much as we can with the money collected under the Knutson-Vandenberg Act on timber sale areas, but sales cover only a small part of the total National Forest area in need of this sort of treatment. Many years must pass before sales can be made on some areas because of impeding non-commercial hardwood growth. It seems to me that we need to build up in Congress and among our key folks an appreciation of the need for this sort of thing. Our I&E effort should look toward the development of a resolution or a bill in Congress which would recognize a plan-wise approach to this problem in the same manner as the Anderson Bill treats reforestation and range revegetation. I am preparing a suggested resolution which I will shortly send in for your consideration. It seems to me that it is something for which we can

develop a great deal of support. Until we are able to apply this treatment to all of our National Forest land in the South that needs it, we are not giving the highest form of management to these public properties. The fact is that some of the larger private owners are ahead of us.

3. It was evident that the management plans for many of the European forests were used as guides and a great deal of discretion in the application of silviculture in carrying out thinnings and harvest cuttings was left to the forester on the ground. I expect that Mason has gone into this a great deal further in his extended stay in Europe and may have more and better founded comments to make than I have, but it seems to me that we have had a tendency in our inspections - certainly at the Regional level - to encourage more literal application of marking principles and other silvicultural rules in these plans than we should have. We have not encouraged our field foresters to accept their responsibility for making on-the-ground decisions which call for modification of practices. I have felt that there was room for improvement in this respect for some time, and we have already started an effort to improve our inspections, both at Regional and Forest levels, to encourage full acceptance of responsibility at the level at which it should be exercised.
4. It was evident that the management unit embraced a relatively small area. It seemed their compartments ran largely between ten and fifty acres in size. As we bring our stands up to full stocking, I believe that here in the South we will want to consider using smaller compartments than we now have.
5. In the South, we are approaching the point where it is necessary to decide the kind of a silvicultural system we are going to follow. In other words, on some areas we are approaching the time of harvest cutting. Many of us have felt that even-aged management was the proper system to use in our Southern pine forests, and I was impressed by the fact that most of the management seen in Europe was of an even-aged nature, using both strip clear-cuttings and shelterwood system.
6. I was impressed by the emphasis the Danes, and other European foresters, placed on seed source. I believe that there is a lesson there which we should adopt. We know that throughout the animal and plant kingdom considerable improvement has been made in the type of product produced by seed selection and plant breeding. I am sure that this must apply in the field of growing tree crops, but today in this country we make little attempt to select the trees which will provide the seed which we will need. I realize that our need for tree seed is enormous and that it might not be practical to collect seed from selected trees in a sufficient amount to meet our needs. We are cost conscious, possibly to the extent that we are sacrificing future values for a lower cost. I believe we should keep the importance of seed collection in mind and move toward that as rapidly as possible.

7. I was quite interested to learn of the examinations required of people applying for hunting licenses in Sweden and some of the other European countries. The examination involves knowledge about the use of a gun, safety in the use of a gun, and sportsmanlike practices. With the increase in number of hunters in the woods in this country, it might be well to encourage the development of a code of hunting practices which each hunter would be required to know before he was issued a hunting license.
8. I was disappointed in what I saw of the emphasis placed on soil by the European foresters. They recognized that under pure coniferous stands, poor soil conditions might develop which would necessitate inclusion of a hardwood crop in rotation to maintain the productivity of the soil. However, there had been little attention given to the relation of different species of trees to the physical, chemical, and biological soil conditions and, consequently, the relation to water. I think the reason for it is the low rainfall, evenly distributed over the year, which minimizes their run-off and erosion problems. I think we have little to learn from them on this matter and, therefore, it is extremely important to push our own research studies in the field of soil.
9. An interesting point to me in Denmark was the fact that, even in a country with only 8% of its area forested and with the Danes interested in making those areas in forest produce the maximum amount of timber, the Government and the people were willing to sacrifice something in the way of dollar return and probably in wood yield in the interest of recreation. There was a law on the books governing the public forests which prohibited any reduction in the area of beech, although the foresters themselves would like to have had more coniferous forests because the returns were higher. The people, however, like to picnic in beech forests and pick up the beech nuts and public pressure brought about this decision to sacrifice some growth and return in the interest of recreation. We find our own foresters often dislike the idea of maintaining roadside strips free from any cutting except the removal of trees about to die. They feel that a well-managed forest is a beautiful thing. Our policies must hold these folks in check in the interest of those people who believe in the natural forest as a thing of beauty.
10. The central features of most of the regulatory laws were the requirement that forest areas had to be regenerated and the limitations or restraints on the conversion of forests to agricultural uses. I did get the impression, however, that both in Finland and Sweden there was a good deal of feeling among foresters that the regulatory laws needed some strengthening.

Impressions of European Forestry

By
Wingfield
 I. T. Haig

1981-

October 31, 1949

Our European trip was such a stimulating experience and presented so many suggestive and worthwhile ideas for further consideration that it is somewhat difficult for me to sift out the worthwhile impressions and suggestions and record these in reasonably brief, intelligible form. I think, however, that the things which impressed me the most were matters of attitudes, the basic concept of European foresters as to their job. Perhaps these might best be summed up in three items:

1. European foresters really practice the art of silviculture, "the care and culture of forests"--a matter of almost academic interest only to us in America up to this time. I got the impression that the average practitioner in European forestry was primarily a silviculturist, tending his forest with much the same attitude that a good gardener might have toward a flower garden. Very often practices were apparently adopted and followed without much thought as to cost if they were believed desirable from a silvicultural standpoint. I have in mind such practices as low cutting of stumps even in spruce with much butt swell, extreme care in saving advance reproduction, very close planting even at considerable expense to induce good distribution of stems and early pruning. Many such operations may be justified by financial returns; but in many cases they seem to justify themselves to the Europeans primarily because they seem to be good silviculture.

Perhaps more of this attitude on the part of our rangers and supervisors, particularly, would be a healthy thing and result in better resource management.

2. Lack of cost consciousness. As indicated under paragraph 1, European foresters often seem to lack cost consciousness if this affected silvicultural operations, in spite of their good knowledge of current market values and monetary yields, as well as a considerable number of formal studies in forest operations and the efficiency of forest labor. Perhaps this attitude reflects past European experience where hand labor has been relatively cheap and it has not been necessary to review hand labor operations with the same critical attitude which we have developed here.

I think our own attitude here is more desirable, though perhaps we could give more thought to good silvicultural methodology as a primary need, as indicated under paragraph 1.

3. Attitude toward research. I came back with the feeling that except in certain specialized fields, as genetics, we probably have little to learn from Europeans. For example, our study of survey methodology, forest influences, forest grazing, and even forest management seem

better organized and more advanced than comparable studies abroad. I was impressed by the fact, particularly in Germany and France, that although research was a highly respectable professional activity, too often procedures were being followed on the basis of "heavyweight authority," the advocacy of some strong and well known leader, rather than on the basis of good experimental data. Too often practices seem to be based on theoretical reasoning, without the experimental comparisons as final proof which we regard as desirable. For example, some advocates of selective cutting methods base their convictions that this method results in higher yields on purely theoretical reasoning without experimental proof and seem perfectly satisfied to accept theory for proof.

I think our somewhat more skeptical attitude is highly desirable. I believe we must recognize, however, that the Europeans naturally feel less need for research than we do because their knowledge, based on long practice and experience, is much better than ours. I think also that we should remember that European experience illustrates the extent to which good forest management is an art rather than a science and attempt to keep constantly in mind (particularly those of us in research) the practical limitations of applying scientific methods to what is essentially an art.

There are a number of other observations of rather disjointed character that seem well worth keeping in mind. For example, it would seem that some of the excellent qualities of forest practices in Europe are due to the long-time tenure of men in key jobs. Many of the forest supervisors we visited, once having attained that status, had apparently a life tenure in that particular job. This gave them the opportunity, if competent (and they had been carefully screened in advance), to leave a real impression on the forests for which they were responsible, which also meant that they had to face this responsibility squarely--they were responsible for the character of management on that area not only to their official superior but also to other potentially critical professional colleagues. We might well think seriously of modifying our present transfer policy to insure longer tenure in resource management positions.

Another interesting observation was the casual acceptance in Europe of the multiple use principle. There seemed to be little question in European minds about the use of forest land for hunting and other forms of recreation and for watershed protection as well as for forest production, and little question about the compatibility of these uses, with the possible exception of excessive game populations, to the detriment of silvicultural measures. I was particularly impressed by the casual assumption that good forest practice was good watershed management. Very few special precautions are apparently taken to insure watershed protection and these are mostly of sanitary character. Few or no restrictions on cutting methods were required with watershed protection needs in mind, though the general good character of forest practices and frequently the absence of any extensive clear

cutting form a major explanation back of this indifference. In Germany, for example, where post war cuttings had made extensive clearings, the German foresters were alert and troubled about watershed values where formerly little attention had been given to this item.

From the standpoint of regulation, it was interesting to note that this has not been too easy to obtain, that is satisfactory conformance, even under European conditions, as illustrated by the fact that both Sweden and Finland have recently found it desirable to tighten up on their regulatory laws. Yet the problem of enforcement is obviously so much easier than ours would be for sometime to come, among other things because of greater land stability and the existing knowledge that forestry does pay. It is obviously easier to obtain conformance to regulatory laws where forest landowners are in the forest production business, if they want any income from their land, partly because it would be very difficult for them to change this accepted land use, clearing often being forbidden by basic law and at least requiring the consent of some governmental body. Then why should one change or object to some regulatory requirements if past production and income shows that timber growing is good business, an undeniable fact in many European regions.

From a technical forest management standpoint, I was also much impressed with the amount of even-aged management which we saw including clear cutting with either natural or artificial regeneration. From the literature and from their own enthusiastic advocate of selective logging practices, I had gotten the impression that selection systems of one sort or another were much more widely practiced in Europe than is apparently the case. Perhaps others had this impression, also.

I was also impressed with the extent to which European foresters are perpetuating an economic species such as pine over large areas where this tree is apparently not the climax. This is similar to the problem which we are facing in the South in pine perpetuation and indicates considerable hope that we can be equally successful.

Another interesting aspect of European forestry is the much larger portion of the value of the product which goes to the landowner. Perhaps this is one of the main reasons why timber growing is felt to be a good and paying business in Europe, one of the main reasons for high quality silvicultural practices. This might be a point well worth following up as, for example, in a study of relative returns to landowners under European as compared to American conditions. It seems obvious that we are going to get good forest practices on private lands only where timber growing pays and perhaps this will require larger allocation of returns to the landowners than we have at present. I have in mind Dr. Osara's comment to me some years ago in which he stated that he thought we would have great difficulty in getting good forest practices on-the-ground in America until the landowner got a larger percentage of the returns, as he now does, for example, in Finland and elsewhere in Europe.

One other item where the Europeans seem to be going ahead of us is in applied genetics, particularly in the use of superior seed and stock for planting and seeding. Two aspects of this are worth very serious thought on our part:

First, the effects of dysgenic practices on existing forest stands and plantations. Some Swedish foresters, at least, believe that their natural forests are much poorer in form and vigor than formerly because past selective (partial) cuttings removed the larger and better trees over several hundred years of operations. Some European foresters are also quite conscious of the danger of seed collections without control of mother tree or stand, especially where uncontrolled seed collections are made primarily with ease of collection and transportation of seed in mind and, therefore, too often from broad crowned, branchy, many coned trees rather than from better, taller trees and stands. Lindquist believes that this is the main reason for the unsatisfactory character of Swedish plantations now reaching middle age. This matter deserves really serious consideration on our parts for we are following and advocating such practices in the United States at this time, as through encouraging selective (partial) cuttings and through uncontrolled seed collections for reforestation purposes.

Second, we are falling behind Europe in developing superior seed sources as through rigid use of seed of known and local origin, through the location of superior stands and trees for seed collections, and through the development of seed orchards based on graftings from superior individuals.

This latter point on the use of better seed for planting and seeding purposes is one on which I think we can take some immediate steps. In the Southeast I am attempting to stimulate discussion and thorough consideration of this topic, first, by a paper which I will present at the annual meeting of Virginia Forests, Inc., in early November, and, second, at a discussion of tree breeding and genetics at the Appalachian Section meeting in January, 1950, if this topic is accepted as has been tentatively done by the committee on arrangements. Here is a technical matter in which the Forest Service could and should take leadership. One of the things that might be done immediately is to insist on the use of seed of known and local origin only or of seed from proper climatic conditions as now called for in the Departmental seed policy. Second, to institute control of seed collection or to undertake these ourselves so that we will know that they are made from trees and stands of at least average or better phenotypes and not merely from the most convenient trees from a collector's standpoint which current knowledge indicates will result in seed of poorer than average genetical quality. I urge the serious consideration of some practical steps along this line. Further steps that might be taken without getting further into the field of controlled tree breeding would be an inventory aimed at identifying stands and trees of superior phenotypes, of practical testing of these trees in so-called tree shows as developed by the Europeans, and in the preservation of superior individuals by types in special plantings or arboreta collections where these might be used in the future as the basis for producing seed in so-called seed orchards.

Impressions of European Forestry

By

Ira J. Mason
October 26, 1949

The benefits I obtained from our European trip were primarily spiritual and inspirational. I say this because I found little in Europe which was directly applicable to forestry in the United States. The European forester does not have to give major attention to forest protection (from fire, insects, or disease), to promotion of markets for forest products, to development of transportation facilities, or to devising ways and means to economize in the use of man hours of labor per output unit. These are the fields which take up a major portion of the energies of most of us concerned with national forest timber administration; and in these fields we are generally more advanced than the Europeans.

The overall inspiration of the European trip was a realization of the place forestry and the forest products industries hold in the economic and social structure of all the countries we visited. In the "mature economy" of Europe growing and harvesting of wood has a much more vital role than foresters in the United States are inclined to claim for their profession. Certainly the opportunities for gainful employment which go with the practice of intensive forestry in Europe open up new vistas of what forestry can ultimately mean in the U.S.A.

One tangible way to gage the level of the forestry profession in Europe is to observe the standards of housing which are provided for public forest managers in all the countries we visited!

Soils

Perhaps some of the European skill in analyzing forest soils and translating these readings into management programs can be directly applied to forests of the U.S., but if so it will require a better soils training than I possess. The principal thing I gained was a feel for the importance of soil knowledge from the nutritional rather than erosion prevention viewpoint and the need to know present soil conditions and probable future results under available choices of management. Geology, soils, micro-climate and ecology are all interrelated in making decisions on how stands should be managed.

It is highly desirable to instill this sort of a feel in our field organization. However the subject must be approached carefully. We have had soils, geology and climate in our management plan outlines for years, and these topics in particular have been pointed at as the overelaboration which has slowed down management planning work. We must figure out how and where these concepts have genuine application at our present levels of management

intensity and train our field men to use these concepts, rather than restate requirements for more elaborate abstract essays on soils in our formal management plans.

Losses and Understocking

One of the most striking lessons I got in Europe was the refusal of foresters to tolerate losses. Most of the damage from insects and disease I observed would be classified as endemic and unavoidable in the U.S. However, the *Ips typographus* losses in Germany and France were resulting in wide scale salvage operations and consideration of changes in species, mixtures, and age classes. A small amount of butt rot (*Fomes Annosus*) in old field spruce was resulting in similar considerations in Denmark.

Unwillingness also to accept low yields per area unit and low quality timber because of poor stocking and too-wide spacing is also characteristic of European forestry. Where partial stands are established and there is little possibility successfully to interplant, the tendency is promptly to liquidate the open grown stock without regard to its age and rate of growth on the individual tree, and to replant with sufficient material to insure adequate future stocking.

Even-Aged Management

The European trip greatly increased my understanding of the possibility of intensive management under an even-aged system. Where intensive management is being applied in Europe there are just as frequent cuttings on the same acre for even-aged management as for uneven-aged management. Thinnings are made at 2-3 or 5-year intervals and gradually shade into partial harvest cuttings. In fact the transition from thinning to harvest cut can best be fixed by definition as a rate of cutting exceeding the periodic growth since the preceding cutting.

Clear cutting through partial harvest cuts (often 5 to 6 on the same acre in the course of 30 years) is a European concept which may help us to understand some partial cutting systems now being used in the U.S. A partial harvest cut is a means to reduce losses and obtain regeneration in a less violent fashion than a single stage clear cutting. If applied to a thrifty mature stand a leisurely period of 30 years for harvesting the crop and establishment of a new crop is a sound procedure since a good increment will be obtained on the residual stand in the course of the 30-year harvesting period. For an overmature decadent forest, particularly where a good basis for identification of poor risk trees is lacking, no increment on the residual stand during the harvest period can be anticipated. Under such conditions it would be preferable to clear cut smaller areas in a single felling and thus promptly obtain regeneration and growth as each area is cut over.

We should realize that some of the cutting we have treated as selective cutting is in reality closer to partial harvest cutting. Much of our work in ponderosa pine is of this nature.

Government Logging

Timber is sold from the public forests in all stages of processing such as standing "on root" - equivalent to our "stumpage," felled and peeled, but not yarded, and in decks along roads. In Sweden there are some state owned sawmill companies. The prevailing principle seems to be that the public agency should engage in such activity as may be needed to market its forest products. This is a good principle which can well be translocated here. The Europeans presume that adequate controls over logging damage will be applied regardless of who does the logging.

Game Management

Only a few gadgets of European game management have any possible application under U.S. conditions. The German system of making an applicant pass an examination to get a hunting license is probably too restrictive here, although the use of driver license examinations is now so thoroughly accepted that hunters' examinations possibly could be sold as a logical extension of the same concept. Likewise the German system of requiring hunters to carry public liability insurance is interesting but would be difficult to establish here.

The European forester is dealing with a population which has long ago given up any ideas of large-scale hunting for the masses. Hunting is a sport for the elite. Apparently like many tree species, the barbershop naturalist was pushed south of the Alps in the ice age and has never gotten reestablished.

Foresters are willing to incur extra expenses for fencing or other measures in order to raise timber in spite of game populations, but they are not particularly interested in positive game management measures to increase wildlife populations.

There is a thorough knowledge of game populations and particularly in Germany detailed hunting plans are prepared. All this, however, is carried on in an atmosphere of abstraction. Meeting public demands for game as expressed by State game commissions is a shocking idea to most any European forester.

The Germans have a game repellent in which planting stock can be dipped. This is a substitute for fencing. Mr. Barrett has taken steps to obtain a working sample of this repellent. It may prove advisable to consult with the Fish and Wildlife Service on further developments along this line for U.S. conditions.

Seeding, Planting, and Natural Regeneration

The emphasis on seed source control in Scandinavia should be transplanted to the United States. Parent trees should be selected for straightness, clean boles, and other desirable characteristics. Just what characteristics are hereditary remains for research to explore but until positive knowledge is obtained it is just good common sense to take seed from our choicest trees for both natural and artificial regeneration.

In artificial regeneration there is need for (1) adequate supervision of field operation of cone collecting to assure that cones are picked from good trees only, (2) adequate separation and labelling of seed from various localities to insure maintenance of identity, (3) in nursery practice adequate follow-up to insure that stock is shipped only for use in the vicinity of origin of seed or such other locations as may be approved by the Regional planting specialist. We need to tighten up our provenance standards.

As an antidote to an overenthusiastic and loose approach to seed selection and tree breeding as a forestry panacea, Dr. Eidman's demonstration on the Frankfurt City Forest will long be remembered (and repeated) by me. Eidman showed us that from the same seed source, Scotch pine tended to be crooked or straight, wolfish or thrifty, depending on whether it was open grown or closely grown in the sapling-pole stage. In forestry it is easy to drift over into Lamarckian evolutionary (inheritance of acquired characteristics) assumptions because we aren't sure which characteristics of trees are developed through environmental influences. Eidman demonstrated that the form of Scotch pine at Frankfurt is an environmental phenomenon. Until we know what is environment and what is hereditary in tree characteristics for different species in different circumstances we must ride both horses; get seed from the best parents; and also manipulate the environment in every practicable way.

In the nurseries, we should also be giving more serious attention to culling before shipping of stock.

The Danes are working with tree breeding to a much larger degree through grafting methods than is used in our tree breeding work. They also already have some seed gardens in operation for the production of hybrid seed in a relatively short time. These are specialized activities on which I was unable to get a full working knowledge in our brief visit. They are developments of which our planting and tree breeding specialists should be aware.

Everywhere in Europe under every system of regeneration-artificial or natural-foresters are working to stocking standards requiring 5 to 10 times the number of trees we accept for a fully stocked stand. This is in part the concept of unwillingness to accept losses in potential yield. It is also made possible and desirable because of the returns which can be realized from early thinnings. Particularly where there is a market for thinnings and machine planting is feasible (as in parts of R-8 and R-9) we should reconsider our spacing standards.

The successful use of seed spotting and broadcast sowing on the snow in Finland is another reminder that where rodents and birds can be kept under control and vegetative competition is not excessive, seeding is an efficient method of reforestation.

In the United States we are a long way off from having the ability to schedule harvest cuttings primarily just before seed years. The need for such shifting is perhaps greatest in the sugar pine type of the western Sierras. With an adequate transportation system and partial harvest cutting it would be

possible to defer the cuts for regeneration to a large degree until seed years. As one Swiss forester put it, cuttings to obtain natural seeding are worthless until a seed year.

Stand Improvement

Our inability to thin at young ages except at out-of-pocket expense is a serious handicap in managing types where reproduction is easy and over-generous. But even when the CCC was available, our thinning concepts were immature. We thought too much in terms of doing the job only once. As a result we either thinned too heavily and risked loss of the stand or the stands closed in after about five years and may not be much better today (10 to 15 years after thinning) than unthinned stands.

My European visit drilled into me that thinning is a continuing process. Every ranger should get the feel of what continuing thinnings can do. I suggest that on each district where there are convenient stands to thin that each ranger be encouraged to spend a few days a year-possibly about 5-in personally thinning some plots. He might experiment with a plot to be thinned at 2, 3, and 5-year intervals. Some men may want to set up plots and take measurements, others might just compare results by observation with nearby unthinned stands. I would encourage this sort of work outside of formal administrative studies, although there should be no barrier to incorporating any particularly systematic work into an administrative study.

Marketing Small Round Material

On reflection, I feel that the biggest thing European foresters have which we lack is a profitable market for small round materials. We can never hope to have the wood fuel markets which are available all over Europe, but we should see whether the many other uses made in Europe of round material of less than sawlog size can be transplanted into the U.S. Scaffolding, round picket fences, and rough slabbed rafters and joists are some such European uses. I intend to needle our timber sale force and the F.U.S. men on this subject from here on out.

Damage to Residual Stand

In Switzerland, scars from logging on roots and trunks were painted with creosote for the purpose of preventing entry of decay organisms. This practice seems to me to be of decided psychological value if made a standard timber sale requirement. Even though Carl Hartley is not enthusiastic over the efficacy of such treatments, I feel we should give consideration to this means of making the operator do something about any tree barking he may have caused. I plan to discuss this at our Portland meeting of Timber Management men.

Equipment

A useful piece of small equipment I saw in Europe was the portable A frame hand winch loader. With a winch bolted to each bunk of a truck, a cross

haul loading system can be used without tying up horses or other equipment. A truck with three men can load small decks of logs or tree length poles without any other equipment. The cost per unit for loading would be high for our wage scale, but it does offer a flexible means for final cleanup and light density salvage which could be useful here.

Some of the small operations in R-3 still use a cross haul loading system. This hand winch system appears to be about as fast and effective as a horse-powered cross haul. Hand winch loading services might be well worth studying by F.U.S.

A minor article of equipment is the knee pads which are part of the standard attire of a Swiss faller. They would be a fine innovation in the U.S.A. if our crews could be prevailed upon to use them.

